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## PRIMARY VERSUS DERIVATIVE FOODS IN TIMES OF FOOD SHORTAGE.\*

HERBERT W. MUMFORD AND ROY H. WILCOX.

A survey of the present and possible future sources of food stuffs of the world reminds us that prior to the war the United States carried the burden of supplying one fifth<sup>1</sup> of the principal world crops and one fourth<sup>2</sup> of the world's meat with which to feed the peoples of her own and other lands. This brings us to the realization that in times of food shortage momentous responsibility for maximum food production rests upon the farmers of the United States. Maximum food production will come only as a result of the most complete utilization of all the agricultural resources of a country. To advocate production of any class of food where such advocacy is unecomonic, is no more unpatriotic nor detrimental than to advocate the destruction and elimination of the sources of such foodstuffs when these sources have a very large and economic place in the agriculture of our country. Such misguided efforts may command attention because striking, but unfortunately they have a tendency to confuse rather than enlighten.

The false impression carried by some, that the action of the British Government in passing the Corn Production Act will in time have to be the action of other peoples as the need for food supplies becomes more urgent, is worthy of careful attention. By this Act<sup>3</sup> "The Board of Agriculture and Fisheries may, if they consider that any land is not being cultivated to the best interests of the country, serve a notice on the occupier requiring him to cultivate it in accordance with their directions. If he fails to do this, the board may, if he be owner of the land, enter on it and take any steps they think necessary for its adaptation or cultivation, all for such time as they think fit."

The purpose of this Act is to bring under the plow grassland suited to the production of wheat and oats. By means of guarantees the

<sup>1</sup> "Geography of the World's Agriculture," by V. C. Finch and O. E. Baker, p. 8.

<sup>2</sup> "International Institute of Agriculture Stat.," Vol. II, February, 1911, No. 2, p. 19.

<sup>3</sup> "Further Provisions of the Corn Production Act 1917," *International Review of Agricultural Economics*, Vol. 84, No. 12, Dec., 1917, p. 75.

\* Paper read before the American Farm Management Association, Baltimore, Maryland, January, 1919.

occupier of the land is induced to turn back to wheat or oat cultivation those acres which were earlier forced from grain growing into grass, not because they produced more human food to the nation in grass, but because the low prices of American and Australian grain imports during the last thirty years of the nineteenth century did not allow the British farmer sufficient remuneration to employ the labor necessary to grain raising. The history of American agriculture, in the main, has seen the increase of wheat prices advantageously coming at a time when land was being developed. The histories of the two agricultures are quite different.

The British husbandman found that in laying down more land to permanent pasture he was able to carry a larger number of stock, but out of necessity he was compelled to adopt the policy of permanent pastures due to inability to finance the necessary outlay in tiling machinery and labor.<sup>4</sup> Along with the Corn Production Act the Statutes of the United Kingdom carry an act empowering the Board of Agriculture to interfere should there be the killing of animals to the extent of endangering their supply of breeding stock. The better farmers feel that by breaking up grass, which has lain for twenty to thirty years more stock can be carried. It was the conviction of the members of Parliament favoring the act that in no way should the future of livestock husbandry be endangered, and even by this seeming drastic step in this time of dire necessity for rapid increases in food suitable for direct human consumption it was believed the husbandman, by cultivating these pastures, could greatly increase his forages to the point where he could maintain his stock numbers.

Food conservation is invariably accompanied by substitution and in some instances has given rise to the thought of elimination of certain well-grounded methods of food production. This evolves from the knowledge that equal portions of our improved farm area if sown to selected crops can render in return maximum food energy for the human body.

Dietary studies center about the proper proportioning of individual foodstuffs, though seldom does a dietitian overlook the palatability of these foods in the search for heat energy. It is possible to serve either grain or meats singly to the individual until this food becomes repulsive through its inability to longer excite the palate, and it has become a well-established fact that although certain highly clarified grain flours supply the body with the necessary calories they leave it susceptible to diseases caused by the lack of the highly necessary vita-

<sup>4</sup> A. T. Matthews in the *Journal of the Bath and West and Southern Counties Society*, Fifth Series, Vol. IX, pp. 1-13.

mines found in meats and in the portion of the grain heretofore discarded or used for stock foods.

Doctor Edward B. Vedder, captain in the Medical Corps of the United States Army, writing in the *Journal of the American Medical Association* (Vol. 67), says that the "Articles, namely, flour, corn-meal, canned goods and salt meat, which have been demonstrated to produce deficiency diseases should be supplemented with white potatoes and fresh meat, known preventives of deficiency diseases, and that these preventive foods should be served at least once a week, and preferably once daily."

The Committee on Nutritional Problems of the Food and Drug Section, American Public Health Association, in their report of October 14, 1918, advise that: "There is nothing more important in the whole problem of food supply than that the purchase of market milk be fully maintained in order to prevent any depletion of the dairy herds. A liberal use of milk in the diet is the best safeguard against any deficiency which might possibly arise through restricted choice of foods, and the safest way to ensure that the consumption of enough food to maintain a normal weight for the height and age, shall meet all other requirements of nutrition as well."

At the outset of this discussion let us get the idea in our minds that our problem is to produce the food that is needed. It is not to produce livestock to the exclusion of farm crops or to produce farm crops to the exclusion of livestock. Our problem is to obtain and maintain the right economic balance between livestock and grain production. It is essential that we strive to maintain our grain supply, but it is none the less important that we guard against the interruption of our large agricultural enterprises in other direction or against unduly unbalancing our agriculture by undertaking to do things which are not desirable from a physical point of view and which are foreign to the habits of our farmers.

The family budget may be considered as safe as any criterion that might be applied to determine the true economic balance between livestock and grain production. From data compiled from the family budgets of 2,567 families in thirty-three states whose breadwinners earned not more than \$1,200, the Bureau of Labor (Bul. 54, p. 1162) found that of the total, family disbursements were divided as follows: 42.54 per cent. for food, 14.04 per cent. for clothing, 12.95 per cent. for shelter, 4.19 per cent. for fuel and 26.18 per cent. for sundries. Of the disbursements for food 55.46 per cent., or substantially more than one half, was spent for meat. The next items in order were 9.72 per cent. for potatoes and other vegetables, 8.96 per cent. for

bread, flour and meal, 5.33 per cent. for sugar and molasses and 5.05 per cent. for fruit.

Or as Mr. Charles J. Brand puts it in the *Journal of Industrial and Engineering Chemistry*, January 18, 1918, "Roughly speaking the diet of the average person in the United States is obtained from the following sources: 39 per cent. animal, 31 per cent. cereal, 25 per cent. fruits and vegetables, and 5 per cent. sugar, condiments, and miscellaneous. On account of the inroads that the war has made upon the herds and flocks of the world, it has been estimated that there has been a decrease of over one hundred million head of cattle, hogs and sheep. Although our own animal production has been increasing slightly during recent years after a long period of serious decline, it has not kept pace with the increase of population to say nothing of our growth in exports of meats. The average exportation of meats during three years preceding the war was something over 493,000,000 pounds. During the war, a year extending from July 1, 1915, to June 30, 1916, the exportation was almost 1,000,000,000 pounds. It is of course impossible to increase animal production quickly enough to produce this requirement. Hence conservation must be called upon in order to provide what is needed."

If any one will count up the various resources of the nation available for livestock production, he will discover two things: first, that there is a vast area of land and an enormous quantity of feed that can be used in no other way; and second, that when this nation has extended its grain production to the limit there will be some land and a great deal more feed that can be used in no other way than in livestock production.

Wheat is our most important human food cereal. This crop prior to the war occupied only 5.14 per cent.<sup>5</sup> of our farm area. All cereals which under extreme conditions might be used for direct human consumption occupy but 21.77 per cent.<sup>6</sup> of our farm area. After accounting for cotton and miscellaneous crops the balance, or approximately 72 per cent. of our area is used for grazing and for hay and forage crops, either permanently or in the necessary farm rotation the land and crops which under present conditions lend themselves naturally to livestock production. The present relation between the areas in those crops suitable for direct human consumption and those now used to produce human food by means of livestock is not fixed and in times of continued food shortages will necessarily change.

<sup>5</sup> U. S. Census, 1910, Vol. V, p. 590.

<sup>6</sup> U. S. Census, 1910, Vol. V, p. 532.

Certain investigators attempt to show that the final uses to which the land of the United States will be put will be about as follows:<sup>7</sup>

|  | Per Cent. |
|--|-----------|
| Agricultural land .....                                | 51        |
| Grazing land .....                                     | 26        |
| Absolute forest land .....                             | 19        |
| Intermediate between agricultural and forest land..... | 2         |
| Barren land .....                                      | 2         |

Other investigators place 62.7 per cent.<sup>8</sup> of the total land area of the United States as suitable for agricultural purposes with at least 19 per cent. of this not agriculturally useful yet always available.

Although it is possible to ultimately crop between 50 and 60 per cent. of our land area it must be remembered that in the meantime there are millions of acres of land which, though potentially tillable are not profitably tilled, still much of it can be profitably used in the less intensive way of grazing livestock. The last census shows only 25.1 per cent. of the total land area improved and in farms. To double this it will be necessary to drain much of the wet land, to irrigate much of the dry land, and to use for grazing in the meantime much of the untilled marginal land that some day may be profitably tilled. If the area in cultivation were increased to the highest possible state of intensity there would be a decrease in the amount of land available for pasture, but there would be an increase of available food for livestock production which would more than offset the decrease in land. The larger the production of grain the greater the volume of grain suitable for livestock production and the more roughage there will be available. This all goes to show a very evident need of livestock, not only to supply the needs of the world population, but at the same time to conserve the by-products of agricultural production. Since a large area of this country is agriculturally useful, but still not suitable for cultivation, since this country produces grain far in excess of human consumption, livestock production can be increased without seriously absorbing our grain supply.

Though it may seem trite to say that a well-organized and administered business means the complete utilization of all factors of production and the profitable disposition of all the products and by-products in agriculture, this situation scarcely ever exists. On a farm which produces grain alone, the land, the horse and man labor, and the equipment are idle for a large part of the year, while the cost of

<sup>7</sup> Circular 159, Forest Service, U. S. Department of Agriculture, pp. 4-15.

<sup>8</sup> U. S. Department of Agriculture, Crop Report.

maintenance, the taxes, and the interest on the investment apply the whole year. On this type of farm even though it carry a heavy investment in labor saving machinery there is normally crowded into two or three months, at the high peak loads,<sup>9</sup> the necessity for as much man labor as is needed throughout the remaining nine or ten months. An agriculture resting upon such a foundation cannot "regard the future with confidence and hope."<sup>10</sup>

A system of agriculture in which the right economic balance is maintained between livestock and grain production is one in which a high percentage of the by-products are utilized and converted into marketable commodities for human consumption. Chief among these commodities are stover, straw, leguminous roughages, and hay, a considerable amount of which will always be grown. The oil meal products of cottonseed and linseed seem to be on the increase. Wheat bran and middlings as by-products of our flour mills run up to vast totals as do also the by-products of the various corn products. In speaking of these sources of food as by-products we too often pass them by without really obtaining a comprehensive knowledge of their value even under present conditions. The fact that they do not easily lend themselves, even under extreme necessity, to direct human consumption does not in the least lower their value as sources of meat production. There are 245,253,000<sup>11</sup> tons of stover produced annually. This stover contains 30 per cent. of the meat-producing power of the corn crop. Then, there are 120,000,000 tons<sup>12</sup> of straw annually, only 54 per cent. of which is used for feed now. These roughages always accompanying the grains are often destroyed under grain systems of farming or when left on the land are a wanton waste of food energy. I question any food policy, attempting to relieve in a time of food shortage, which sets aside any roughage or by-product that supplies 30 per cent. of the meat-producing power of our corn crop—a policy which disregards our corn stover, of one and one half times more value in its capacity to produce meat than the present oat, barley and rye crops combined. This by-product, if siloed and fed in a ration with nothing else than one pound of cottonseed or linseed oil meal<sup>13</sup> daily, will maintain forty-five million cows during six months of the year, and will bring them through in good physical

<sup>9</sup> U. S. Yearbook 1911, p. 278.

<sup>10</sup> "Agriculture After the War," A. T. Matthews, *Journal of the Bath and West and Southern Counties Society*, Vol. XI, p. 14.

<sup>11</sup> *Weekly News Letter*, September 12, 1917, p. 4, U. S. D. A.

<sup>12</sup> Monthly Crop Report, May 10, 1915, p. 5, U. S. D. A.

<sup>13</sup> Unpublished work of Professors Rusk and Grindley, of Illinois University.

condition, while they are furnishing at the same time a full and normal calf crop. As this stover is all found, and will have to be fed, in the corn producing territory, these forty-five million cows can be carried the remaining six months on the twenty million<sup>14</sup> acres of legumes now planted for nitrogen fixation and used principally for forage crops, together with the unimproved acres in the farm area and on some of the eighty-five million<sup>14</sup> tons of leguminous hays produced annually.

Every year there is a certain proportion of grain that is damaged, grain not fit for human consumption. In 1915 about 14.4 per cent. (146,000,000 bushels) of the total wheat crop<sup>15</sup> was unmillable. Ordinarily 5 per cent. (135,000,000 bushels) of the corn crop is not fit to husk<sup>16</sup> and in 1917 only 72 per cent. of the total crop was fit to husk. A certain amount of grain is harvested and shipped yearly which is in such poor condition and of such low grade that it cannot pay the expense of shipment. Under systems where no livestock exists these grains constitute a loss which in times of food shortage is not justifiable. Experience with the corn crop of 1917 convinces the farmer of the United States it is unsafe to be found without hogs, cattle, sheep, or the dairy cow to insure against a loss from immature grain, much of it unfit even to harvest unless by livestock.

I do not wish to tire you with statistics, but we cannot overlook the vast store of energy in the by-products of the mills, factories and oil presses. There are 2,000,000 tons<sup>17</sup> of cotton seed meal, and 1,012,088 tons<sup>18</sup> of linseed oil meal annually to combine with farm roughages and grains, or with grass in fitting livestock for the winter or for market. There are over a million and a half tons<sup>19</sup> of cotton-seed hulls. The by-products of wheat milling normally exceed<sup>20</sup> in quantity all the small grains fed on the farm. Besides supplying the outlet for surplus corn and grain, livestock is necessary to the best utilization of the by-products of agricultural commerce.

<sup>14</sup> Price Current Grain Reporter, Statistical Annual 1915, p. 75, and 1916, p. 79, and the U. S. D. A. Crop Reporter, October 17, pp. 96-101.

<sup>15</sup> Rosenbaum Review, May, 1917, p. 7.

<sup>16</sup> U. S. D. A. Monthly Crop Report, Nov., 1917, Vol. 3, No. 11, p. 110.

<sup>17</sup> U. S. D. A. *Weekly News Letter*, Vol. II, No. 11, and Vol. III, No. 32, and *Commercial America*, September, 1915, Vol. XII, No. 3, p. 9.

<sup>18</sup> This amount is exported. U. S. D. A. *Weekly News Letter*, Vol. II, No. 11, and Vol. III, No. 32.

<sup>19</sup> Figures for 1913 show 1,564,000 tons. *Commercial America*, September, 1916, Vol. XII, No. 3, p. 9.

<sup>20</sup> 222,523,093 bushels of grain ordinarily fed or 63.5 per cent. barley, 39.2 per cent. oats, and 12.7 per cent. wheat. U. S. D. A. *Farmers' Bulletin*, No. 629.



Since the chief object of farming is to produce food and clothing material and since after the human needs have been satisfied, under pre-war conditions, the residue of the farm crops left on the farm have included in addition to vast quantities of roughage, 80 per cent. of the corn crop, 63.5 per cent. of the barley, 39.2 per cent. of the oats, and 12.7 per cent. of the wheat,<sup>21</sup> there is a very evident need of livestock to utilize to the fullest extent these products. Ours is notably a meat and corn eating population, with corn on the one hand most used under dire necessity, meat on the other indicating greater ability to earn the substantial things of life. If under normal conditions it became necessary to forego marketing this corn crop to the workman in the form of meat and give it to him in the original state it would without question indicate the lowering of the standard of living.

Though the production of food is the most important function of the livestock industry, it is not the only one. These are manufactures which utilize the excess fat, blood, bones, skins, hoofs, hair, and all other parts. Industries, subsidiary to the meat packing industry, which are producing supplies for which there is an increasing demand, have been developed. Notwithstanding the fact that slaughtering increases the value of the product by about 14 per cent. the packers are able to sell the animal's carcass at a figure which is below the purchasing cost. The explanation of this lies in the profit returned from the by-products of the meat packing industry.

Hides and skins form one of the largest single items of manufacturers' materials imported, their value in the fiscal year 1917 having been 216 and  $\frac{1}{3}$  million dollars against 57 and  $\frac{3}{4}$  million in 1900, an increase of almost four times during the seventeen years. The increase in quantity, however, is much less than that in value, from 346 million pounds in 1900 to 700 million in 1917, a gain of nearly 100 per cent. in quantity as compared with an increase of 275 per cent. in value. Hides and skins seem likely to continue to be an extremely important factor in the import trade. In 1900 hides and skins of foreign origin constituted about 36.7 per cent. of the national supply, in 1910 about 26.1 per cent. and in 1915 about 32.8 per cent.

Without going into detail concerning the wool supply, it can be stated that the situation is about the same as with the leather. The peculiar demands for wool incident to the war are such that the United Kingdom which supplied the United States with 38,897,503 pounds of wool for the manufacture of clothing in 1915 has found it

<sup>21</sup> U. S. D. A. Farmers' Bulletin, No. 629.

impossible to ship more than 1,555,182 pounds in the year ending June, 1917, a decrease of 96 per cent. The latest statistics (1915) show that the United States has each year drawn a larger percentage of her wool supply from foreign sources until now her home production is but 35 per cent. of her consumption.

A careful and conservative estimate shows that the barnyard manure produced by the farm animals (horses, mules, milch cows, beef cattle, sheep, and swine) of the United States if properly conserved and applied to the soils of this country would have a value equivalent to increasing yearly our corn crop by 674,000,000 bushels, our wheat crop by 329,000,000 bushels and our clover hay by 23,300,000 tons. It is probable that at present less than one fourth of the barnyard manure of the United States is properly conserved and applied to the soil. If three fourths instead of one fourth of this barnyard manure could be conserved and applied to our lands, and I believe it could, we would thereby increase the value each year of our farm crops equivalent to 337,000,000 bushels of corn, 165,000,000 bushels of wheat and 11,700,000 tons of clover hay.

Attention should also be called to the fact, that in addition to barnyard manure, farm animals furnish considerable quantities of fertilizers, known as packing-house by-products, such as dried blood, dried meat, tankage, hoof meal, horn dust, hair, leather meal, wool waste, raw and steamed bones, bone black, bone ash, etc. Surely a tremendously significant resource for food production which should be mobilized and intelligently utilized.

It is high time we changed our point of view and our attitude toward the whole livestock industry from looking upon it as destroyer to that of a conserver of human food in its proper place just as essential, just as economic as cereal production. Where necessary, practice must be changed to conform to this new order of things. The sooner this is done the sooner a constructive program of livestock production can be courageously and vigorously pursued.

A permanent agriculture must be a profitable agriculture—a profitable agriculture for all people, not forgetting those who are not favored by having a highly fertile, unbroken acreage, all of which can be profitably employed for the production of cereals. I repeat, a permanent agriculture, a permanently profitable agriculture is inseparable from rational systems of livestock production.